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Global Transmission of Interest Rates

Monetary Independence and the Currency Regime

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Hikes in U.S. interest rates in 1999–2000 have started to spill over to other economies' interest rates, which in many countries have risen to reflect the higher U.S. rates. Are countries with flexible exchange rates better able to isolate their domestic interest rates from this type of negative international shock? Less and less so, as economies become more integrated.

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Summary findings

Frankel, Schmukler, and Servén empirically study the sensitivity of local interest rates to international interest rates and how that sensitivity is affected by a country's choice of exchange rate regime.

To establish the empirical regularities, they use a reduced-form empirical approach to compute both panel and single-country estimates of interest rate sensitivity for a large sample of developing and industrial economies between 1970 and 1999.

When using the full sample, they find that:

- Interest rates are typically lower in economies with fixed exchange rates than in those with flexible exchange rates.
- More rigid currency regimes tend to exhibit higher transmission than more flexible regimes.

In many cases in the 1990s, however, the authors cannot reject full transmission (a slope coefficient equal to 1), even for several countries with floating regimes. The data suggest an upward time trend in the degree to which domestic interest rates are sensitive to international capital movements and developing economies' increased financial integration with the rest of the world.

As a result, country-specific estimates for the 1990s reveal few cases of less-than-full transmission of international interest rates to domestic rates, regardless of the currency regime.

Country-specific results suggest that only large industrial countries can (or choose to) benefit from independent monetary policy. During the 1990s, interest rates in European countries were fully sensitive to German interest rates but insensitive to U.S. interest rates.

This paper—a joint product of Macroeconomics and Growth, Development Research Group, and the Chief Economist Unit, Latin America and the Caribbean Region—is part of a larger effort in the Bank to understand the functioning of alternative currency arrangements. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Emily Khine, room MC3-347, telephone 202-473-7471, fax 202-522-3518, email address kkhine@worldbank.org. Policy Research Working Papers are also posted on the Web at www.worldbank.org/research/workingpapers. The authors may be contacted at jeffrey_frankel@harvard.edu, sschmukler@worldbank.org, or lserven@worldbank.org. August 2000. (33 pages)

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1. Introduction

As has also been true in past episodes of global monetary tightening, 1999-2000 hikes in U.S. interest rates were rapidly reflected in interest rate increases in other industrial and developing economies. In emerging markets, the increases were in several cases proportionally larger than those experienced in the US, presumably because country and/or currency risks increased after the Fed decided to tighten US monetary policy. Even though the pressure to increase interest rates was felt virtually across the board, one question remains unanswered: are countries with flexible exchange rates more able to isolate their domestic interest rates from this type of negative international shock? This issue of monetary independence, which lies at the heart of the debate on currency arrangements, is the central question of this paper.

The choice of exchange rate regime—floating, fixed, or somewhere in between—has been a recurrent question in international monetary economics. According to the conventional view, the two major advantages of fixing the exchange rate are: (1) reduced transactions costs and exchange rate risk, that can discourage trade and investment, and (2) a credible nominal anchor for monetary policy.

The advantages of a flexible exchange rate, on the other hand, can generally be described under one major property: it allows the country to pursue independent monetary policy.[1] The argument in favor of monetary independence, instead of constraining monetary policy by the fixed exchange rate, is the classic argument for discretion instead of rules. When the economy is hit by a disturbance, such as a shift in

[1] To be sure, other factors enter as well. Two other advantages of an independent currency are that the government retains seignorage, and floating allows smooth adjustment to real shocks even in the presence of price frictions. Most of the important factors, however, can be lumped into the major arguments presented in the text.

worldwide demand away from the goods it produces, the government would like to be able to respond, so that the country does not go into recession. Under fixed exchange rates, monetary policy is always diverted, at least to some extent, to dealing with the balance of payments. Under the combination of fixed exchange rates and complete integration of financial markets, which characterizes the European monetary union, monetary policy becomes completely powerless.[2] By freeing up the currency, on the other hand, the country can respond to a recession by means of monetary expansion and depreciation of the currency. This stimulates demand for domestic products and returns the economy to desired levels of employment and output, more rapidly than would be the case under the automatic mechanisms of adjustment on which a fixed-rate country must rely.[3]

According to the traditional arguments, under pegged exchange rates and unrestricted capital flows, domestic interest rates cannot be set independently, but rather must track closely those prevailing in the country to which the domestic currency is pegged. By contrast, under a flexible exchange rate arrangement, the domestic interest rate should be less sensitive to changes in international interest rates—other things equal. Countries with intermediate regimes should also display less sensitivity to international interest rates than countries with firm pegs.

However, an alternative view—stated, among others, by Calvo and Reinhart (2000a and 2000b) and Hausmann, Panizza, and Stein (2000)—holds that there exists

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[2] An expansion in the money supply has no effect: the new money flows out of the country, via a balance of payments deficit, just as quickly as it is created. In the face of an adverse disturbance, the country must simply live with the effects. After a fall in demand, for example, the recession may last until wages and prices are bid down, or until some other automatic mechanism of adjustment takes hold.

[3] For a more complete exposition of the advantages and disadvantages of alternative exchange rate regimes, see Frankel, Schmukler, and Servén (2000).

"fear of floating," that prevents countries with *de jure* flexible regimes from allowing their exchange rates to move freely. According to this view, factors like lack of credibility, exchange rate pass-through, and foreign-currency liabilities prevent countries from pursuing an independent monetary policy, regardless of their announced regime. Therefore, many countries, even if formally floating, are *de facto* "importing" the monetary policy of major-currency countries, much as those with pegs.

Although monetary independence has been at the heart of the debate on exchange rate regimes, empirical evidence on the issue is still scarce. In particular, there are few empirical studies on whether floating exchange rate regimes do indeed allow independent monetary policy, in the sense that interest rates in countries with floating regimes are less sensitive to foreign interest rates. Focusing on currency boards and some floating regimes, Borensztein and Zettlemeyer (2000) find some evidence consistent with the traditional view. On the other hand, selected country evidence during the 1990s—reported in Frankel (1999) and Hausmann, Gavin, Pages, and Stein (1999)—is consistent with the alternative view.

The goal of this paper is to establish the major empirical regularities concerning the sensitivity of domestic interest rates to international interest rates under different currency regimes. To do this, we analyze existing experiences from the widest possible spectrum of regimes, from full exchange rate flexibility to currency boards. Thus, the paper should help place the ongoing debate in the context of the observed facts, and allow

an assessment of the competing claims cited above on the relative merits of alternative exchange rate arrangements from the perspective of monetary independence.[4]

The paper extends the empirical literature in several directions. First, while previous studies have been limited to a handful of countries over short time periods, here we consider a much larger data set in both the cross-country and time-series dimensions, by working with a sample of industrial and developing countries over the last three decades. Second, we test the robustness of the results to changes in sample coverage. We present estimates both for the overall sample as well as subsamples of industrial and developing countries and different time periods. Third, to deal with the inaccuracies of standard exchange rate regime classifications, we also present empirical results for selected countries, whose exchange arrangements are generally regarded as more clear-cut than the rest. Finally, even though we work mainly with US rates as our primary indicator of "foreign interest rates," we also take into account the emergence in recent years of other currency areas, most notably the Deutsche mark-European Monetary Union (DM-EMU) zone. Thus, we examine the sensitivity of European interest rates to German interest rates.

The rest of the paper is organized as follows. Section 2 introduces the methodology and data used in this paper. Section 3 presents pooled estimation results by exchange rate regime, income group, and decade. Section 4 takes a closer look at the evidence from individual countries. Section 5 summarizes the results and concludes. The Appendix describes the exchange rate regimes in each country in the sample.

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[4] There is an extensive literature that studies the merits of different exchange rate regimes in other dimensions. For example, Ghosh, Gulde, Ostry, and Wolf (1996) analyze the behavior of inflation and growth under alternative exchange rate arrangements.

2. Methodology and Data

In principle, there are several factors that determine the extent to which domestic and foreign interest rates move together. The first one is the degree of financial integration of the domestic economy into world markets. For example, as described in Kaminsky and Schmukler (2000), barriers to international capital flows can dampen the response of local interest to changes in international rates. Second, the degree of *real* international integration also matters for the comovement of domestic and foreign interest rates—if business cycles are highly synchronized across countries, domestic and foreign rates will tend to move closely together, given other things. Third, the nature of shocks also contributes to determine the degree of comovement. Unlike country-specific idiosyncratic shocks, common shocks—such as financial and climatic—affect many countries simultaneously, what tends to be reflected in closer correlation of interest rates, for given degrees of international real and financial integration.

Our primary concern here, however, is to establish the empirical regularities regarding the overall link between local and foreign interest rates, rather than sorting out the role of each of the above factors. Thus, we focus on the estimation of a simple reduced-form specification of the type

$$r_{i,t}^{lc} = f_i + \beta\, r_t^* + \gamma' X_{i,t} + \varepsilon_{i,t}, \qquad (1)$$

where $i = 1,...,N$ and $t = 1,...,T$. Here $r_{i,t}^{lc}$ represents the domestic nominal interest rate in local currency of country i at time t; f_i is a country-specific effect;[5] r_t^* is the international interest rate; and $X_{i,t}$ is a set of control variables. We assume that the error term $\varepsilon_{i,t}$ has

mean zero and is independently distributed across countries, but is possibly heteroskedastic and serially correlated.

We experimented with two sets of control variables X_{it}. The first one includes only the difference between the domestic and foreign inflation rates.[6] We do this because much of the variation in nominal interest rates across countries and over time may just reflect variation in inflation rates, which is quite substantial in our sample.

Next, we added into X_{it} a set of dummy variables to control for turbulent periods, when the sensitivity of local interest rates to foreign ones may differ from its "normal" value. Specifically, we used three dummies. The first one is a "crisis" dummy that, following the literature on exchange rate crises, takes a value of one when the cumulative depreciation of the nominal exchange rate over a three-month period is equal to or greater than 15 percent. The second is a hyperinflation dummy that takes a value of one when monthly inflation is above 50 percent, and zero otherwise. Finally, the third is a "transition" dummy to control for changes in the exchange rate regime—specifically, exit from pegs to other regimes. Since such exits tend to be accompanied by considerable financial turbulence, in the absence of controls the new regime may be unduly associated with higher or more volatile interest rates and inflation, among other things.[7] The transition dummy takes a value of one in the month of the transition as well as those

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[5] Note that time specific effects cannot be included, because they would be perfectly collinear with r_t^*.

[6] All interest rates and inflation rates x are defined as $ln\ (1+x)$. We also experimented with a somewhat more general version including separately domestic and foreign inflation, rather than entering them as a differential. Results with this broader specification, however, showed that in general the differential specification was not rejected by the data.

[7] This is noted, for example, by Edwards and Savastano (1999).

immediately preceding and following it.[8] To allow some additional flexibility in our specification, we also interacted the three dummies with the foreign interest rate. On the whole, the empirical results obtained including the dummies were quite similar to those from the specification with inflation alone, and hence to save space we only report the latter below.[9]

We estimate equation (1) separately for each currency regime, since preliminary evidence showed that neither the country effects nor the coefficients on the control variables were equal across regimes. For each regime, we are interested in two parameters, characterizing respectively the sensitivity of the local interest rate to the foreign rate (β in equation (1) above), and the average level of the local interest rate after controlling for the other factors. The latter can be summarized by a parameter α, defined as:

$$\alpha = \frac{1}{N}\sum_{i=1}^{N} f_i ,$$

that is, the average of the country-specific effects under the regime in question.[10]

We present two types of estimates. In section 4, we report pooled fixed-effect estimates, combining all the available information as well as grouping countries by income level and breaking the sample by decade (1970s, 1980s, and 1990s), to see if

[8] We also experimented with other specifications enlarging the transition period and dropping the corresponding observations. Likewise, we used different variations on our crisis dummy—working with higher and lower depreciation thresholds and periods. These alternative specifications had only a modest impact on the parameters of interest.

[9] Those results are available upon request and downloadable from www.worldbank.org/lacconferences.

[10] Strictly speaking, this definition would apply if under each exchange rate regime all countries possessed the same number of time-series observations. In practice, this is not the case because our panel is heavily unbalanced. The formula then is amended using weights given by the respective number of observations.

there are any significant differences along these dimensions. In section 5, we report country-specific estimates, for which $N = 1$ and hence the level parameter α is just the regression constant.

According to conventional wisdom, more flexible exchange rate regimes should allow countries additional room to pursue their independent monetary policy. Therefore, the sensitivity to international interest rates should increase with the rigidity of the exchange rate regime. In other words, for a given degree of capital mobility, real integration, and other factors, we would expect $\beta_{\text{fixed}} \rangle \beta_{\text{intermediate}} \rangle \beta_{\text{floating}}$. In fact, in a fixed exchange rate regime with full capital mobility we should expect $\beta_{\text{fixed}} = 1$. At the opposite extreme, if domestic monetary policy is completely independent, we would expect $\beta_{\text{floating}} \approx 0$. In that case, the exchange rate bears the burden of absorbing the shocks to international interest rates. However, it is more common for countries to pursue "dirty floating" arrangements under which they usually intervene in foreign exchange markets, and in those cases we should find $\beta_{\text{managed floating}} \rangle 0$.

In turn, the country-specific effect f_i measures, for each country and under each regime, the average level of the interest rate not accounted for by foreign interest rates and the inflation differential. Hence, it may be viewed as reflecting the mean level of currency risk and country risk not captured by other variables. The average of the country-specific effects under each regime (α as defined earlier) can then be viewed as a measure of the regime's mean currency risk plus country risk. Thus, if for example more rigidly fixed exchange rate regimes reduce devaluation expectations, for given country risk perceptions, we should obtain $\alpha_{\text{fixed}} \langle \alpha_{\text{intermediate}} \langle \alpha_{\text{floating}}$.

2.1 Data

Our basic source of interest rate data is the International Financial Statistics of the IMF. We work with monthly data on local money market rates for the 1970s, 1980s, and 1990s. We choose money market interest rates because they reflect market forces better than deposit rates. The latter, while much more widely available, are often subject to administrative controls and in many cases display little movement over prolonged periods, which renders them uninformative for our purposes.[11] When available, we choose the 90-day money market rate; otherwise, we use the 30-day rate. As international interest rate, we use the 90-day US T-bill rate.[12] Finally, for some experiments below, we use also the German 90-day T-bill rate.

The classification of exchange rate regimes is taken from the IMF. The Appendix lists the regime prevailing in each country over the sample period according to this source. The classification used here is based on a quarterly database from the IMF on exchange rate regimes encompassing a total of 10 categories, based on officially reported exchange arrangement for the period 1975-1996; see the Appendix for more details. We present some empirical results (in Table 1 below) from estimating equation (1) using the detailed regime categories in the original source. However, to facilitate our analysis, in the rest of our experiments we condense these categories into three broader exchange rate

[11] In a number of cases we found that the money market interest rate data from IFS were identical to the deposit data. In such cases, we discarded countries/periods for which rates showed no variation or infrequent step-wise movements.

[12] We also experimented with the LIBOR US dollar rate. The results were very similar, since the two rates are very highly correlated

regimes: fixed (pegs), intermediate (limited flexibility, crawls, bands, managed floating), and flexible (free-floating).[13]

The rest of our data—exchange rates, inflation, and country indicators, such as population and income level on which the sample selection is based—come from the World Bank-IMF databases.

We focus on industrial economies and middle-income developing countries. Within this broad group, sample coverage is dictated by the availability of adequate interest rate data.[14] The sample that results comprises 47 countries (18 industrial and 29 developing) in addition to the US, whose interest rate is used as an explanatory variable, and a total number of monthly observations exceeding 9,400.

3. Interest Rate Sensitivity: Pooled Estimates

We first assess empirically the sensitivity of domestic interest rates to US interest rates by estimating equation (1) using the entire sample, as well as distinguishing between industrial and developing countries and considering subsamples defined by time period.

Table 1 presents the full-sample fixed-effects estimation results, using a five-regime classification of currency arrangements. To avoid cluttering the table, here and in the rest of the paper we only report the coefficients of interest—i.e., the slope parameter

[13] As a robustness check, we compared the results obtained with this condensed classification with those obtained using the classification of Ghosh et al. (1996). On the whole, the results were very similar.

[14] We dropped country/regime episodes possessing less than one year of consecutive monthly observations. We also excluded countries with population under one million, countries without availability of long exchange rate series (which automatically leads to the exclusion of Eastern European economies), low income countries (in which the incidence of interest rate controls is more widespread), and countries with prolonged internal or external war periods.

β and the level parameter α defined earlier—and omit the estimated coefficients on the inflation differential and the individual country-regime fixed effects.

The top line of Table 1 shows that for the entire sample, taken as a whole, the sensitivity of domestic to foreign rates is 0.76—and not significantly different from one at conventional significance levels. The rest of the table shows the results obtained estimating separate panels by exchange rate regime. Taken at face value, the pattern of slope coefficients that emerges across regimes seems to conform to conventional wisdom: it is highest (at 0.76) in the pegged regimes—followed by the intermediate regimes at 0.55. Interestingly, there seems to be little difference whether the peg is to the US dollar or to other currencies. Floating regimes show the lowest interest sensitivity at 0.27. In fact, for the pure and managed floating regimes, the slope coefficient is estimated imprecisely and is not significantly different from zero.

The estimated constants under each regime also deserve mention. As noted earlier, they could be viewed as reflecting the level of the domestic interest rate characteristic of each regime, after removing the effects of inflation and international interest rates. The table shows that, given other things, the level of local interest rates is lowest under fixed exchange rate arrangements.[15] At the other extreme, floating and managed floating regimes tend to exhibit the highest interest rate levels, given other factors.

In spite of the simplicity of our empirical specifications, they capture a fair amount of the observed variation in interest rates, as shown by the total and within R^2

[15] Actually, the level estimate is lowest for pegs to currencies other than the dollar. This might reflect the fact that during the sample period these currencies had, on average, lower interest rates than the ones pegged to the US dollar.

statistics in the table. (The within R^2 excludes the portion of the fit attributable to the specific effects.)

Thus, pooling all countries and all time periods, the results seem to support the traditional view, according to which interest rates from more flexible currency regimes are less sensitive to foreign interest rates. We next investigate whether this result holds when we partition the sample by income level and time period. To keep the amount of information manageable, we proceed in the same fashion as Ghosh et al. (1999) and condense the various exchange rate regimes into only three broader categories: fixed, intermediate, and floating.

Table 2 divides the sample between industrial and developing countries. For the entire sample of developing countries, the slope estimate is close to one (although not very precise); while for industrial economies it is just above 0.62 and significantly different from unity. As before, however, there are important differences across regimes. In both subsamples, the largest slope coefficient corresponds to the pegged regimes—close to unity in the industrial countries, but considerably lower in the developing countries. In the industrial economies, the intermediate regimes exhibit the least sensitivity to foreign interest rates. In the developing countries, no clear conclusion can be drawn since the slope estimate under floating is highly imprecise (and negative). Interestingly, slope estimates are uniformly lower in the developing country sample, regardless of regime. Rather than implying that developing countries enjoy more monetary independence than industrial ones under any regime, the likely explanation for this result is that, over the full 30-year sample period, developing economies were on

average less integrated than industrial economies into world financial markets and their interest rates are determined less freely in the market.

Finally, the regime constants show a pattern opposite to that of the slope estimates: for each regime, they are larger in the developing country sample than in the industrial country sample. The difference is particularly striking in the case of floating regimes. This suggests that, other things equal, developing countries tend to exhibit higher interest rates than industrial countries. Across regimes, the same pattern found in Table 1 holds for both developing and industrial countries: the constant is lowest in pegged regimes than in the rest.

The above results are open to question, however, because the long time span of the full sample may conceal significant variation over time in the sensitivity of domestic to foreign interest rates, as barriers to international capital movements have declined steadily over the last two decades. To explore this, Tables 3 and 4 further disaggregate the samples of developing and industrial countries by decade. Table 3 presents the results for developing countries by decade and regime. It is apparent from the table that our slope estimates under floating regimes are very poor in all three decades of available data—the point estimates are negative and exhibit large standard errors. Leaving floating regimes aside, the table does suggest an upward trend in the estimated slope coefficients across decades, both for fixed and intermediate regimes. In the 1990s, both fixed and intermediate regimes exhibit a high degree of sensitivity to foreign interest rates, with slope coefficients not significantly different from unity.

Table 4 presents the same information as the previous table for industrial economies. It is important to note that the industrial country sample does not include any

fixed regimes after the 1970s; hence the fixed exchange rate results for the 1970s are just those shown in Table 2 above for the entire sample period, and they reveal full transmission of international interest rates. In the 1970s and 1980s, there is little difference between the slope estimates of intermediate and floating regimes, with the former slightly larger than the latter. In the 1990s, however, the result is reversed: floating regimes show a slope estimate very close to one, while for intermediate regimes we obtain a puzzling slope estimate, small and not different from zero.

To summarize this section, a naïve look at our full-sample results would seem to lend support to the conventional wisdom that fixed exchange rate regimes show greater sensitivity of domestic to foreign interest rates than the other regimes. In addition, fixed regimes also tend to exhibit lower average interest rates after other factors have been taken into account. Using the full sample period, we also find that in general the sensitivity of domestic interest rates to foreign rates appears higher in industrial than in developing countries, a result suggestive of the more limited financial integration of the latter economies over the sample period.

When looking at the results in more detail, however, the conventional wisdom fares less well, and some puzzles emerge. First, among developing economies, both the fixed and intermediate regimes appear to exhibit full transmission of foreign interest rates in the 1990s. In contrast, the pooled data do not yield any sensible slope estimates for the developing-country floating regimes. Second, among industrial countries, the floating regimes also exhibit full transmission in the 1990s, while intermediate regimes display an awkward pattern, with their slope estimate declining to nearly zero in the 1990s. This latter result is puzzling, because it appears to run counter the worldwide trend towards

increasing financial integration. It is worth noting that the EMU group accounts for the bulk of countries under this regime in the 1990s, and this raises the question of whether US interest rates—rather than, say, German interest rates—really provide the right measure of external financial conditions for this group of countries.

In summary, there are clear discrepancies between the pooled estimates from the full sample and those obtained from the income and period-based subsamples. In addition, the results using pooled data may also suffer from limitations related to the accuracy of the underlying regime classification, as well as the more general concern of heterogeneity across countries—which the pooled estimates limit to the relatively trivial dimension of country-specific constants. To assess the relevance of these concerns, we next turn to country-specific estimation.

4. Interest Rate Sensitivity: Heterogeneous Estimates

To avoid possible heterogeneity biases that might be present in the pooled estimates of the previous section, here we focus on individual-country estimates of equation (1). Further, we focus on a few selected countries whose exchange rate regime can be categorized in a relatively straightforward manner, in order to avoid the risks of misclassification that arise when using a large number of countries. Also, we limit our attention to the 1990s, where the puzzles mentioned above appear more evident.

Table 5 presents estimation results for 10 developing countries, grouped in the following three regime categories. Hard pegs (currency boards) consist of Argentina and Hong Kong. Intermediate regimes (including currency bands, managed floats, and similar arrangements) involve Chile, Indonesia, Israel, Singapore, and Thailand. Free-

floating regimes comprise Mexico after the Tequila crisis, Philippines, and South Africa.[16] In addition to the point estimates and their standard errors, the table also reports the p-values from the test of the null hypothesis that the slope coefficient equals one (i.e., full sensitivity of domestic interest rates to foreign interest rates).

The first two rows of Table 5 report the estimates for the "hard pegs" of Argentina and Hong Kong. The point estimates of the slope coefficient are close to one, although the estimate for Argentina is rather imprecise. The next block in Table 5 reports the results for the intermediate regimes. Here all the slope estimates are statistically different from zero, and several of them are actually larger than one.[17] In fact, we cannot reject the hypothesis that US interest rate changes are fully reflected in local rates for any of the countries in the table.

The last block in the table presents the floating regimes, which yielded implausible slope estimates in the pooled regressions of the previous section. For Mexico, this continues to be the case in Table 5. The point estimate is large, negative and very imprecise, a likely reflection of the financial turbulence following the Tequila crisis that resulted in skyrocketing domestic interest rates at a time when they were declining in the US. For the Philippines, in contrast, we find a high slope coefficient, above unity. Finally, for South Africa the slope coefficient exceeds one at standard confidence

[16] In a number of instances the residuals display serial correlation; rather than differencing the data and losing potentially valuable information, we report Newey-West standard errors robust to both heteroskedasticity and autocorrelation. We set the number of lags for the Newey-West covariance matrix computation at three. Results with other lag specifications were similar in most instances.

[17] Whenever data permitted, we also computed country-specific estimates for an extended sample period, which we do not report to save space. With very few exceptions, the estimates for the 1990s reported here were generally larger than those calculated with longer samples, suggesting an upward time trend in the degree of interest rate transmission.

levels.[18] The pattern of the estimated constants across regimes is also reminiscent of that found in the previous section: they are generally higher in the floating regimes than in the rest.

On the whole, therefore, the developing country estimates do not show much difference across exchange regimes regarding the sensitivity of local interest rates to foreign ones. In most cases the estimates are consistent with the hypothesis of full transmission of foreign interest rate disturbances, regardless of exchange regime. One important exception is Mexico, where the estimates are too imprecise to permit any firm conclusion. In the rest of cases, however, the data suggest that the slope coefficients are equal to or greater than one in the 1990s.

We now turn to the industrial countries. The pooled estimates from the previous section revealed two surprising facts. First, intermediate regimes appeared to exhibit a declining sensitivity to foreign interest rates, which became practically negligible in the 1990s. Second, floating regimes showed the opposite trend, with their slope coefficient becoming equal to one in the 1990s. We next explore these two issues in more depth.

Concerning the first puzzle, it is important to note that European countries account for the bulk of the intermediate regimes in the 1990s. Country-specific estimates, which we do not report here to save space, confirm the findings from the pooled regression, namely that the sensitivity of local rates to US T-Bill rates falls abruptly in the 1990s. As noted earlier, however, most of these countries have in fact belonged to the DM (now EMU) area for quite a few years, and it is unclear whether US rates provide the right measure of "foreign interest rates" for them.

[18] South Africa's multiple exchange rate regime was unified in 1995.

To illustrate this fact, Table 6 presents estimation results for six of these economies using the German T-bill interest rate rather than the US T-bill rate as explanatory variable. The results are revealing. The slope estimates are all highly significant (with the exception of Italy in the 1990s, whose available sample is very short). The slope coefficients actually exceed one—significantly so in all cases except Belgium.[19] Thus, the declining pattern of the slope coefficients found in the pooled estimates is not a reflection of increased monetary independence but, on the contrary, a straightforward consequence of the fact that these countries have de-linked themselves from the US dollar area to become tightly linked with the DM.

Finally, we turn to the industrial-country floating regimes. Table 7 reports regression results for three large economies (Germany,[20] Japan, and the UK) and three smaller ones (Australia, New Zealand, and Canada). The table shows a striking contrast between the two groups. The three smaller economies exhibit large slope coefficients exceeding one—significantly so in Australia and New Zealand. Further, the explanatory power of the estimated equations is fairly high. The larger economies, in turn, all possess slope coefficients below one. For both the U.K. and Germany, the estimate for the 1990s is insignificantly different from zero and significantly different from one. In turn, Japan has the highest slope coefficient in this group (0.73). It is not significantly different from one, although its precision is relatively low.[21] Again in contrast with the smaller

[19] Again, if one uses longer sample periods (starting in the 1970s and 1980s), the slope coefficients turn smaller—showing an increasing pattern over time, as the EMU area consolidated.

[20] Germany obviously does not float vis-à-vis her EMU partners, but can be viewed as floating vis-à-vis the US dollar.

[21] Japan's full-sample estimate under floating (corresponding to the years 1973-99) is 0.65, numerically similar to that obtained in the 1990s, but its precision is much higher (a standard error of 0.09), so that it can be safely viewed as smaller than one.

economies, the explanatory power of the empirical equations is quite poor for the three large floating-regime economies.

To summarize this section, the closer inspection of individual country data confirms some of the findings from the pooled regressions, and also helps solve some of the puzzles they posed. On the whole, we find little evidence in the 1990s against the hypothesis of full transmission of foreign interest rate disturbances into domestic rates, regardless of exchange regime and income level. On the contrary, slope coefficients tend to exceed one in several industrial and developing countries

There are exceptions, however. Most notably, large industrial countries with floating regimes (Germany and the UK) exhibit slope coefficients well below unity. This suggests that large industrial countries may be the only economies that truly possess, or make use of, monetary independence.

5. Conclusions

In this paper we have tested whether the transmission of international interest rate changes to local rates is affected by the exchange rate regime. This is an important question in the context of the debate on the choice of currency regime, in which the issue of monetary independence has played a central role. Proponents of free-floating arrangements have argued that countries adopting floating regimes would be able to pursue their own monetary policy goals, while advocates of hard pegs have questioned the feasibility of such a strategy in a world of high international capital mobility.

The paper has taken a first step towards assessing empirically the relative merits of these two views, by reviewing the empirical regularities on international interest rate

linkages for a large sample of industrial and developing countries. The approach taken here extends and generalizes earlier studies that have focused on a small group of countries over brief time periods. Specifically, the paper has examined the evidence from industrial and developing countries over the last three decades, using both pooled and single-country empirical estimates. The objective is to establish the main stylized facts that will need to be addressed in the debate on monetary independence and the choice of currency regime. To do this, we have employed simple reduced-form specifications relating domestic to world interest rates. In spite of their simplicity, the empirical models capture a large proportion of the variance in local interest rates, within and across countries.

The main result of the paper is that over the last decade all exchange rate regimes exhibit high sensitivity of local interest rates to international ones. Indeed, in the 1990s we find very few instances of less-than-full transmission (i.e., a slope coefficient significantly smaller than one), regardless of exchange rate regime. This result emerges both from the country-specific estimates and from close inspection of the pooled estimates.

The main exception to this rule is provided by a few large industrial countries, which according to the evidence in the paper appear to be the only ones that can or choose to benefit from independent monetary policy. Specifically, the slope coefficients for Germany and the UK—large economies with floating regimes vis-à-vis the US—are statistically smaller than one. In contrast, in other industrial countries, including smaller economies with floating regimes (Australia, Canada, and New Zealand), local interest

rates fully reflect US rates. Among developing-country floating regimes, the results are somewhat noisier.

Interestingly, during the 1990s, interest rates in European countries have become virtually insensitive to US interest rates—but fully sensitive to German interest rates. Thus, European countries have shifted from the US monetary area to the DM-EMU monetary area between the 1970s and 1990s, and the decline in the responsiveness of their interest rates to US interest rates does not signify any increase in their degree of monetary independence.

It is important to note that the finding of complete transmission is masked in the full-sample pooled estimates, which taken at face value would appear to support the conventional wisdom—that fixed currency regimes tend to exhibit higher transmission than more flexible regimes. The main reason is that the long time span of the full sample (30 years) mixes periods characterized by very different degrees of interest rate transmission. Indeed, the data suggest an upward time trend in the degree of sensitivity of domestic to foreign interest rates, consistent with the gradual removal of barriers to international capital movements and the increased financial integration of developing economies with the rest of the world.

Finally, our pooled results suggest that interest rates are in most instances lower in countries with fixed exchange rate regimes. The difference appears particularly large in developing countries.

To conclude, the empirical regularities identified in the paper leave many questions open for future research. We shall mention three. The first one concerns the interpretation of our finding of full transmission in the 1990s, in fixed and flexible

regimes alike, except for large industrial economies. Does this mean that floating-regime countries are not able to pursue their independent monetary policy, or rather that they choose not to float, perhaps due to fear of floating?

Related to this, what is the role of financial integration in the increasing degree of interest rate transmission shown by the data? The "Impossible Trinity" principle states that countries can choose two of the following three: capital mobility, monetary policy, and exchange rate flexibility. However, the fact that we found virtually full transmission in the 1990s seems to imply that financial integration might be playing a bigger role than the above principle suggests.

Finally, the paper has not explored the channels through which international interest rates are transmitted to domestic rates, nor the dynamics of the transmission process. For example, to understand better the determinants of the degree of transmission, it would be useful to explore separately the impact of international rates on country risk premium and currency premium. This is the subject of ongoing research.

Appendix: Exchange Rate Regime Classification

The starting point is the IMF's quarterly database on exchange rate regimes, which encompasses a total of 10 categories, based on officially reported exchange arrangements for the period 1975-1996.

We transform the IMF database to a monthly basis, complementing the original source with information contained in Cottarelli and Giannini (1997). Finally, the classification is extended until March 1999, using information from IMF reports and publications, including the Exchange Rate Arrangements and Restrictions and the International Finance Statistics, 1998 and 1999. For the countries used in the individual-country estimates, we extend the classification until December 1999. In addition to the original classification, we construct new categories to account for the specific currency to which some fixed regimes are pegged.

For most experiments in the paper, we condense the ten categories in the original source into three broader exchange rate regimes: fixed (pegs), intermediate (limited flexibility, crawls, bands, managed floating), and flexible (free-floating). Specifically, pegged regimes include: peg to the US dollar, peg to the French franc, peg to other currencies (comprising Indian rupee, South African rand, British pound, and Deutsche mark), peg to SDR (IMF basket), and basket pegs (including the so-called Bretton Woods basket peg). In turn, intermediate regimes include: limited flexibility with respect to a basket, limited flexibility with respect to a single currency, limited flexibility with respect to a cooperative arrangement (including the European Monetary System), managed floating, crawling pegs, and crawling bands. The full details are given in the Appendix Table.

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Table 1
Local Interest Rate Responsiveness to US T-bill Rate by Exchange Rate Regime

The table reports the constant and slope coefficients of the local interest rate (money market) on the US T-bill rate. The models are calculated by exchange rate regime. All regressions contain country fixed effects and the inflation differential between each country and the US, which are not reported in the table to save space. Data are from industrialized and developing countries in the 1970s, 1980s, and 1990s. Newey-West standard errors are in parenthesis. ** and * mean that the estimate is statistically different from 0 at the 5 percent and 10 percent significance level respectively.

	Constant	US T-bill rate	R-squared total	R-squared within	Number of countries	Number of observations
Whole sample	0.05 **	0.76 **	0.76	0.56	47	9,441
	(0.00)	(0.23)				
Fixed regimes	0.04 **	0.76 **	0.76	0.31	13	517
	(0.01)	(0.31)				
pegged to US dollar	0.06 **	0.68 *	0.75	0.38	7	323
	(0.01)	(0.40)				
pegged to other currencies	0.02 **	0.64 **	0.71	0.28	8	194
	(0.00)	(0.28)				
Intermediate regimes	0.08 **	0.55 **	0.84	0.39	39	6,160
	(0.00)	(0.07)				
band	0.05 **	0.60 **	0.56	0.17	30	4,098
	(0.00)	(0.07)				
managed floating	0.13 **	0.22	0.86	0.48	28	2,062
	(0.01)	(0.19)				
Free-floating regimes	0.10 **	0.27	0.85	0.30	27	2,764
	(0.01)	(0.33)				

Table 2
Local Interest Rate Responsiveness to US T-bill Rate by Income Group

The table reports the constant and slope coefficients of the local interest rate (money market) on the US T-bill rate. The models are calculated by exchange rate regime. All regressions contain country fixed effects and the inflation differential between each country and the US, which are not reported in the table to save space. Data are from industrialized and developing countries in the 1970s, 1980s, and 1990s. Industrialized countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom. Developing countries are all the other countries listed in the Appendix Table. Newey-West standard errors are in parenthesis. ** and * mean that the estimate is statistically different from 0 at the 5 percent and 10 percent significance level respectively.

	Constant	US T-bill rate	R-squared total	R-squared within	Number of countries	Number of observations
Developing countries:						
Whole sample	0.06 **	0.93 *	0.76	0.58	29	4,279
	(0.01)	(0.56)				
Fixed regimes	0.05 **	0.63 *	0.76	0.35	7	384
	(0.01)	(0.34)				
Intermediate regimes	0.11 **	0.45 **	0.85	0.43	25	2,933
	(0.01)	(0.15)				
Free-floating regimes	0.24 **	-0.92	0.84	0.31	14	962
	(0.02)	(1.11)				
Industrialized countries:						
Whole sample	0.04 **	0.62 **	0.47	0.22	18	5,162
	(0.00)	(0.07)				
Fixed regimes	0.00	1.03 **	0.79	0.51	6	133
	(0.01)	(0.19)				
Intermediate regimes	0.05 **	0.60 **	0.44	0.20	14	3,227
	(0.00)	(0.06)				
Free-floating regimes	0.03 **	0.70 **	0.53	0.26	13	1,802
	(0.00)	(0.21)				

Table 3
Local Interest Rate Responsiveness to US T-bill Rate
Developing Countries by Decade

The table reports the constant and slope coefficients of the local interest rate (money market) on the US T-bill rate. The models are calculated by exchange rate regime. All regressions contain country fixed effects and the inflation differential between each country and the US, which are not reported in the table to save space. Newey-West standard errors are in parenthesis. ** and * mean that the estimate is statistically different from 0 at the 5 percent and 10 percent significance level respectively.

	Constant	US T-bill rate	R-squared total	R-squared within	Number of countries	Number of observations
1970s:						
Fixed regimes	0.08 **	0.05	0.94	0.01	4	191
	(0.00)	(0.10)				
Intermediate regimes	0.07 **	0.51 *	0.96	0.12	5	177
	(0.01)	(0.27)				
Free-floating regimes	0.22 **	-0.48	0.94	0.02	2	42
	(0.06)	(0.71)				
1980s:						
Fixed regimes	0.23 **	0.87 *	0.17	0.17	1	29
	(0.06)	(0.49)				
Intermediate regimes	0.13 **	0.42 **	0.87	0.50	13	1,091
	(0.02)	(0.18)				
Free-floating regimes	0.17 **	-0.01	0.90	0.02	4	294
	(0.02)	(0.45)				
1990s:						
Fixed regimes	0.01	1.09 **	0.64	0.62	2	164
	(0.02)	(0.25)				
Intermediate regimes	0.11 **	0.76 **	0.82	0.19	22	1,665
	(0.01)	(0.37)				
Free-floating regimes	0.41 **	-4.99	0.89	0.55	11	626
	(0.04)	(4.24)				

Table 4
Local Interest Rate Responsiveness to US T-bill Rate
Industrialized Countries by Decade

The table reports the constant and slope coefficients of the local interest rate (money market) on the US T-bill rate. The models are calculated by exchange rate regime. All regressions contain country fixed effects and the inflation differential between each country and the US, which are not reported in the table to save space. Data are from industrialized and developing countries in the 1970s, 1980s, and 1990s. Newey-West standard errors are in parenthesis. ** and * mean that the estimate is statistically different from 0 at the 5 percent and 10 percent significance level respectively.

	Constant	US T-bill rate	R-squared total	R-squared within	Number of countries	Number of observations
1970s:						
Fixed regimes	0.00	1.03 **	0.79	0.51	6	133
	(0.01)	(0.19)				
Intermediate regimes	0.04 **	0.60 **	0.33	0.10	11	845
	(0.00)	(0.13)				
Free-floating regimes	0.04 **	0.53 *	0.57	0.11	7	382
	(0.01)	(0.27)				
1980s:						
Fixed regimes	..	..	..	..	..	..
Intermediate regimes	0.06 **	0.49 **	0.72	0.27	12	1,314
	(0.00)	(0.10)				
Free-floating regimes	0.06 **	0.38 **	0.79	0.14	7	616
	(0.00)	(0.19)				
1990s:						
Fixed regimes	..	..	..	..	..	..
Intermediate regimes	0.07 **	0.02	0.25	0.01	13	1,068
	(0.00)	(0.16)				
Free-floating regimes	0.02 **	0.92 **	0.48	0.19	10	804
	(0.00)	(0.29)				

Table 5
Local Interest Rate Responsiveness to US T-bill Rate
Developing Countries

The table reports the constant and slope coefficients of the local interest rate (money market) on the US T-bill rate. The coefficient for inflation is not reported, but it is included in all regressions. Newey-West standard errors are in parenthesis. ** and * mean that the estimate is statistically different from 0 at the 5 percent and 10 percent significance level respectively.

	Sample	Constant	US T-bill rate	Test slope = 1 (p-value)	R-squared	Number of observations
Fixed regimes:						
Argentina	3/91- 12/99	0.01	1.33	0.70	0.71	106
		(0.04)	(0.87)			
Hong Kong	1/94 - 12/99	0.01	1.01 **	0.96	0.16	72
		(0.01)	(0.16)			
Intermediate regimes:						
Chile	1/90 - 8/99	0.03	1.99 **	0.21	0.49	116
		(0.04)	(0.80)			
Indonesia	1/90 - 6/99	0.05 *	1.35 **	0.60	0.50	102
		(0.03)	(0.67)			
Israel	1/90 - 12/99	0.08 **	0.94 **	0.65	0.41	120
		(0.01)	(0.12)			
Singapore	1/90 - 12/99	0.00	0.86 **	0.21	0.41	120
		(0.01)	(0.11)			
Thailand	1/90 - 3/97	0.02	1.42 **	0.15	0.44	87
		(0.01)	(0.29)			
Free-floating regimes:						
Mexico	12/94-12/99	0.22 *	-1.22	0.38	0.76	61
		(0.12)	(2.54)			
Philippines	1/90-12/99	0.05 **	1.29 **	0.52	0.24	120
		(0.02)	(0.46)			
South Africa	1/90-12/99	0.06 **	1.44 **	0.02	0.44	120
		(0.01)	(0.19)			

Table 6

Local Interest Rate Responsiveness to German T-bill Rate
European Industrial Countries with Intermediate Regimes

The table reports the constant and slope coefficients of the local interest rate (money market) on the German T-bill rate. The coefficient for inflation is not reported, but it is included in all regressions. Newey-West standard errors are in parenthesis. ** and * mean that the estimate is statistically different from 0 at the 5 percent and 10 percent significance level respectively.

	Sample	Constant	German T-bill rate	Test slope=1 (p-value)	R-squared	Number of observations
Belgium	1/90 - 12/98	0.00 (0.00)	1.02 ** (0.02)	0.38	0.95	108
Denmark	1/90 - 12/99	0.00 (0.00)	1.25 ** (0.10)	0.01	0.83	120
Italy	1/90 - 8/92	0.07 ** (0.04)	0.53 (0.43)	0.28	0.16	32
Netherlands	1/90 - 12/98	0.00 (0.00)	1.05 ** (0.02)	0.00	0.99	108
Portugal	1/90 - 12/99	1.82 ** (0.10)	1.82 ** (0.10)	0.00	0.85	108
Spain	1/90 - 12/99	0.01 (0.01)	1.44 ** (0.13)	0.00	0.83	108

Table 7

Local Interest Rate Responsiveness to US T-bill Rate
Industrial Countries with Free-Floating Regimes

The table reports the constant and slope coefficients of the local interest rate (money market) on the US T-bill rate. The coefficient for inflation is not reported, but it is included in all regressions. Newey-West standard errors are in parenthesis. ** and * mean that the estimate is statistically different from 0 at the 5 percent and 10 percent significance level respectively.

	Sample	Constant	US T-bill rate	Test slope =1 (p-value)	R-squared	Number of observations
Australia	12/90-12/99	-0.02	2.02 **	0.00	0.83	78
		(0.01)	(0.17)			
Canada	1/90-12/99	-0.01	1.49 **	0.15	0.45	120
		(0.02)	(0.34)			
New Zealand	1/90-12/99	0.00	1.69 **	0.00	0.69	119
		(0.01)	(0.18)			
Germany	1/90-12/99	0.06 **	-0.10	0.00	0.01	108
		(0.02)	(0.37)			
Japan	1/90-12/99	-0.01	0.73 **	0.46	0.11	120
		(0.02)	(0.37)			
United Kingdom	9/92 - 12/99	0.06 **	0.05	0.00	0.03	88
		(0.01)	(0.23)			

Appendix Table
List of Countries in Sample and Their Exchange Rate Regimes

Country	Period		Exchange Regime Classification	
	from	to	detailed	aggregate
Argentina	Jan-80	Mar-81	Managed floating	Intermediate
	Apr-81	Jun-82	Independently floating	Floating
	Jul-82	Jun-89	Managed floating	Intermediate
	Jul-89	Nov-89	Peg to US dollar	Fixed
	Dec-89	Feb-91	Independently floating	Floating
	Mar-91	Mar-99	Peg to US dollar	Fixed
Australia	Oct-74	Nov-76	Limited flexibility with respect to a basket	Intermediate
	Dec-76	Nov-83	Managed floating	Intermediate
	Dec-83	Jun-96	Independently floating	Floating
Austria	Feb-70	Aug-71	Bretton Woods basket peg	Fixed
	Sep-71	Sep-94	Limited flexibility with respect to a basket	Intermediate
	Oct-94	Dec-98	Limited flexibility with respect to a cooperative arrangement	Intermediate
Belgium	Feb-70	Dec-71	Bretton Woods basket peg	Fixed
	Jan-72	Jan-99	Limited flexibility with respect to a cooperative arrangement	Intermediate
Bolivia	Jan-95	Dec-97	Independently floating	Floating
	Jan-98	Dec-98	Managed floating	Intermediate
	Jan-99	Mar-99	Crawling peg	Intermediate
Brazil	Mar-90	Sep-94	Independently floating	Floating
	Oct-94	Dec-98	Managed floating	Intermediate
	Jan-99	Mar-99	Independently floating	Floating
Canada	Jan-75	Mar-99	Independently floating	Floating
Chile	Jan-78	May-79	Independently floating	Floating
	Jan-80	May-82	Peg to US dollar	Fixed
	Jun-82	Jun-82	Managed floating	Intermediate
	Jul-82	Dec-98	Crawling peg to a basket	Intermediate
	Jan-99	Mar-99	Crawling band	Intermediate
Colombia	Mar-95	Dec-98	Managed floating	Intermediate
	Jan-99	Mar-99	Crawling band	Intermediate
Costa Rica	Jan-90	Dec-91	Managed floating	Intermediate
	Jan-92	Sep-95	Independently floating	Floating
	Oct-95	Dec-98	Managed floating	Intermediate
	Jan-99	Mar-99	Crawling Peg	Intermediate
Denmark	Jan-72	Mar-99	Limited flexibility with respect to a cooperative arrangement	Intermediate
Dominican Republic	Mar-96	Mar-99	Managed floating	Intermediate
Ecuador	Nov-86	Sep-94	Managed floating	Intermediate
	Oct-94	Sep-95	Crawling peg to a basket	Intermediate
	Oct-95	Dec-98	Managed floating	Intermediate
	Jan-99	Mar-99	Crawling band	Intermediate
Egypt	Jan-97	Mar-99	Managed floating	Intermediate
El Salvador	Jan-97	Mar-99	Managed floating	Intermediate
Finland	Dec-77	Aug-92	Limited flexibility with respect to a basket	Intermediate
	Sep-92	Sep-96	Independently floating	Floating
	Oct-96	Mar-99	Limited flexibility with respect to a cooperative arrangement	Intermediate
Germany	Feb-70	Apr-70	Bretton Woods basket peg	Fixed
	May-70	Dec-71	Independently floating	Floating
	Jan-72	Mar-73	Bretton Woods basket peg	Fixed
	Apr-73	Mar-99	Limited flexibility with respect to a cooperative arrangement	Intermediate
Greece	Jan-90	Dec-94	Managed floating	Intermediate
	Jan-95	Dec-96	Independently floating	Floating
	Jan-97	Feb-98	Managed floating	Intermediate
	Mar-98	Mar-99	Limited flexibility with respect to a cooperative arrangement	Intermediate
Guatemala	Jan-97	Mar-99	Independently floating	Floating
Hong Kong, China	Dec-90	Mar-99	Peg to US dollar	Fixed
Indonesia	Jan-83	Jul-98	Managed floating	Intermediate
	Aug-98	Jul-98	Independently floating	Floating
Ireland	Mar-72	Apr-72	Bretton Woods basket peg	Fixed
	Jun-72	Dec-78	Peg to pound sterling	Fixed
	Jan-79	Mar-99	Limited flexibility with respect to a cooperative arrangement	Intermediate
Israel	Jan-90	Nov-91	Limited flexibility with respect to a basket	Intermediate
	Dec-91	Dec-98	Managed floating	Intermediate
	Jan-99	Mar-99	Crawling band	Intermediate
Italy	Jan-71	Dec-71	Bretton Woods basket peg	Fixed
	Jan-72	Jan-73	Limited flexibility with respect to US dollar	Intermediate
	Feb-73	Dec-78	Independently floating	Floating
	Jan-79	Aug-92	Limited flexibility with respect to a cooperative arrangement	Intermediate
	Sep-92	Sep-96	Independently floating	Floating
	Oct-96	Mar-99	Limited flexibility with respect to a cooperative arrangement	Intermediate
Japan	Jan-70	Dec-72	Bretton Woods basket peg	Fixed
	Jan-73	Mar-99	Independently floating	Floating
Korea, Rep.	Aug-76	Dec-79	Peg to US dollar	Fixed
	Jan-80	Nov-97	Managed floating	Intermediate
	Dec-97	Mar-99	Independently floating	Floating
Kuwait	Jan-79	Mar-99	Limited flexibility with respect to a basket	Intermediate
Lebanon	Jan-82	Dec-94	Independently floating	Floating
Malaysia	Jan-70	Jun-72	Peg to pound sterling	Fixed
	Jul-72	Jun-73	Peg to US dollar	Fixed
	Jul-73	Aug-75	Independently floating	Floating
	Sep-75	Mar-93	Limited flexibility with respect to a basket	Intermediate

Appendix Table
List of Countries in Sample and Their Exchange Rate Regimes

Country	Period		Exchange Regime Classification	
	from	to	detailed	aggregate
	Apr-93	Aug-98	Managed floating	Intermediate
	Sep-98	Mar-99	Peg to US dollar	Fixed
Mauritius	Jan-88	Sep-94	Limited flexibility with respect to a basket	Intermediate
	Oct-94	Mar-99	Managed floating	Intermediate
Mexico	Apr-81	Jun-82	Managed floating	Intermediate
	Jul-82	Sep-82	Peg to US dollar	Fixed
	Oct-82	Nov-94	Managed floating	Intermediate
	Dec-94	Mar-99	Independently floating	Floating
Netherlands	Jan-70	Apr-70	Bretton Woods basket peg	Fixed
	May-70	Dec-71	Independently floating	Floating
	Jan-72	Dec-98	Limited flexibility with respect to a cooperative arrangement	Intermediate
New Zealand	Mar-85	Feb-85	Managed floating	Intermediate
	Mar-85	Mar-99	Independently floating	Floating
Norway	Jan-72	Nov-78	Limited flexibility with respect to a cooperative arrangement	Intermediate
	Dec-78	Oct-90	Limited flexibility with respect to a basket	Intermediate
	Nov-90	Nov-92	Limited flexibility with respect to a cooperative arrangement	Intermediate
	Dec-92	Apr-94	Independently floating	Floating
	May-94	Mar-99	Managed floating	Intermediate
Paraguay	Oct-90	Jun-98	Independently floating	Floating
Philippines	Oct-81	Jun-82	Limited flexibility with respect to US dollar	Intermediate
	Jul-82	Sep-84	Managed floating	Intermediate
	Oct-84	Mar-99	Independently floating	Floating
Portugal	Jan-83	Sep-90	Crawling peg to a basket	Intermediate
	Oct-90	Mar-92	Managed floating	Intermediate
	Apr-92	Mar-99	Limited flexibility with respect to a cooperative arrangement	Intermediate
Singapore	Aug-73	Jun-87	Limited flexibility with respect to a basket	Intermediate
	Jul-87	Mar-99	Managed floating	Intermediate
South Africa	Feb-70	Apr-72	Bretton Woods basket peg	Fixed
	May-72	Sep-72	Peg to pound sterling	Fixed
	Oct-72	May-74	Peg to US dollar	Fixed
	Jun-74	Jun-75	Managed floating	Intermediate
	Jul-75	Jan-79	Peg to US dollar	Fixed
	Feb-79	Mar-99	Independently floating	Floating
Spain	Jan-74	Jan-74	Bretton Woods basket peg	Fixed
	Feb-74	Dec-75	Limited flexibility with respect to a basket	Intermediate
	Jan-76	Dec-87	Managed floating	Intermediate
	Jan-88	May-89	Independently floating	Floating
	Jun-89	Mar-99	Limited flexibility with respect to a cooperative arrangement	Intermediate
Sweden	Jan-70	Dec-71	Bretton Woods basket peg	Fixed
	Jan-72	Jul-77	Limited flexibility with respect to a cooperative arrangement	Intermediate
	Aug-77	Apr-91	Limited flexibility with respect to a basket	Intermediate
	May-91	Oct-92	Limited flexibility with respect to a cooperative arrangement	Intermediate
	Nov-92	Mar-99	Independently floating	Floating
Switzerland	Sep-75	Sep-78	Independently floating	Floating
	Oct-78	Dec-79	Peg to Deutsche mark	Fixed
	Jan-80	Mar-99	Independently floating	Floating
Thailand	Jan-77	Feb-78	Peg to US dollar	Fixed
	Mar-78	Jun-81	Limited flexibility with respect to a basket	Intermediate
	Jul-81	Mar-82	Managed floating	Intermediate
	Apr-82	Oct-84	Limited flexibility with respect to US dollar	Intermediate
	Nov-84	Jun-97	Limited flexibility with respect to a basket	Intermediate
	Jul-97	Jun-98	Managed floating	Intermediate
	Jul-98	Mar-99	Independently floating	Floating
Turkey	Apr-86	Dec-98	Managed floating	Intermediate
	Jan-99	Mar-99	Crawling peg	Intermediate
United Kingdom	Jul-72	Apr-72	Bretton Woods basket peg	Fixed
	May-72	Jun-72	Limited flexibility with respect to US dollar	Intermediate
	Jul-72	Feb-87	Independently floating	Floating
	Mar-87	Feb-88	Managed floating	Intermediate
	Mar-88	Sep-90	Independently floating	Floating
	Oct-90	Jun-92	Limited flexibility with respect to a cooperative arrangement	Intermediate
	Jul-92	Mar-99	Independently floating	Floating
Uruguay	Dec-92	Dec-98	Managed floating	Intermediate
	Jan-99	Mar-99	Crawling band	Intermediate
Venezuela	Apr-96	Dec-98	Managed floating	Intermediate
	Jan-99	Mar-99	Crawling band	Intermediate

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